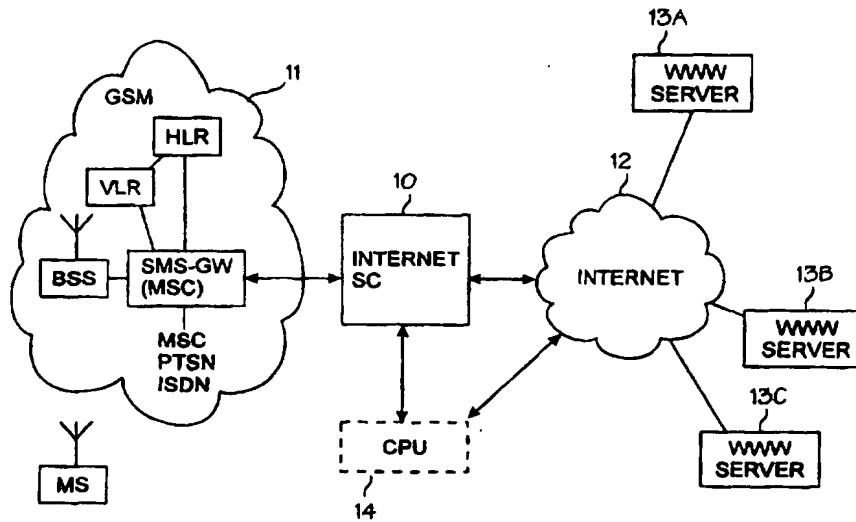




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(54) Title: DATA SERVICE IN A MOBILE COMMUNICATION NETWORK



(57) Abstract

The invention relates to Internet service in a digital mobile communication network by means of short message service. For this purpose the short message service centre (SC) is connected to the Internet network and uses the HTML, HTTP, and TCP/IP protocols towards the Internet network. Short messages are transferred between the short message service centre (SC) and mobile stations (MS) in the usual manner. The user submits to the service centre a short message containing an identifier indicating the desired WWW page. The short message centre or said other equipment sets up a connection to the desired WWW server via the Internet network, receives therefrom the WWW page, and stores it. The relevant part is separated from the WWW page and is sent to the mobile station in a short message. The relevant part of a WWW page may be identified by a predetermined criterion, common to all subscribers, or it may be based on a criterion received from the mobile station, such as a keyword. The mobile station processes the received short message in the usual manner and displays it to the user.

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DATA SERVICE IN A MOBILE COMMUNICATION NETWORK

BACKGROUND OF THE INVENTION

The invention relates generally to digital mobile communication systems and more particularly to providing data service in a mobile communication system.

Mobile communication systems refer, in general, to different telecommunication systems providing personal wireless data transmission while subscribers roam the system area. A typical mobile communication system is the public land mobile network PLMN.

Besides conventional speech transmission, digital mobile communication systems provide a plurality of other services: short messages, facsimiles, data transmission, etc. Of these, the data transmission service, in particular, provides a mobile subscriber a chance of wireless access to nearly all data services of fixed networks.

The use of the Internet data network in fixed networks has increased very rapidly. As is well known, the Internet network actually comprises a large number of smaller interconnected networks. Data transmission in Internet is packet-switched in accordance with the TCP/IP protocol (Transmission Control Protocol/Internet Protocol). The growing popularity of Internet is primarily due to a system called World Wide Web (WWW). The WWW system consists of servers in the Internet network and customer programs used by these servers, called WWW browsers. The information in the WWW servers is arranged into pages which are the basic units of the WWW technique, as whole pages are always transferred between a server and a browser. In addition to text, the page may also contain graphics and various other file types, such as voice and video. The pages used by the WWW technique are described with the HTML language (Hyper Text Mark-up Language). Information on text format, graphics, etc. is coded among the actual text contents by HTML tags. The browser program uses these tags to give a WWW page the desired format.

There is a connection between a WWW server and a user only during the transfer of a WWW page to a user. This means that when requesting a WWW page, a user sends a transfer request to a WWW server which sends the requested page back via the line. Transfer requests and WWW pages are transferred by the HTTP protocol (Hyper Text Transfer Protocol).

The receiver's browser program restores the WWW page received into the right form in accordance with the HTML language. A transferred WWW page is stored in the memory of the user's computer, the user being able to browse the page on his/her own screen. The addressing format of the Internet WWW servers is URL (Uniform Resource Locator).

Through the data transmission services of mobile communication systems, the numerous information sources of the Internet network are, in principle, available to mobile subscribers, too. However, the use of data transmission services typically requires a mobile station provided with data transmission properties, and a computer connected thereto. At present, mobile stations including an integrated computer, such as the Nokia Communicator, are available. However, these are relatively expensive alternatives and hence not suitable to occasional usage by an ordinary mobile subscriber.

The Internet network, however, offers numerous information sources which could be useful to an ordinary user, too. These could include e.g. flight, train, bus schedules, weather and traffic reports, telephone number and address information etc. At present, most of these services are free of charge and available to everybody. Internet is also commonly used in companies for internal services. Thus it would be advantageous to render the various information sources offered by Internet available to users of mobile stations without any data transmission facilities.

DISCLOSURE OF THE INVENTION

It is an object of the present invention to retrieve information from the Internet network without the need to use the data transmission service of a mobile communication network, or a browser program of World Wide Web pages in a mobile equipment.

This is achieved with a method of accessing a data network in a digital mobile communication system providing short message service. The method is characterized by the steps of

transferring a short message including an identifier indicating a Word Wide Web (WWW) page in the Internet network from a mobile station over the mobile communication network to a short message service centre having access to the Internet network either directly or via a computer in connection with said service centre,

communicating towards the Internet network using the protocols of

the Internet network and retrieving said WWW page indicated by said short message, or a part of said WWW page,

converting a relevant part of the contents of said WWW page into a short message,

5 sending the short message over the mobile communication network to the mobile station,

displaying the contents of the short message on the display of the mobile station.

The invention also relates to a short message service centre for a
10 digital mobile communication system providing short message service, the short message service centre comprising: first means for accessing a mobile communication network for transferring short messages between the short message service centre and mobile stations, and second means for accessing a data network. The service centre is characterized in that

15 said data network is the Internet network,

said second means comprise means for retrieving Word Wide Web (WWW) pages from the Internet network using the protocols of the Internet network in response to a short message sent by a mobile station, the message either directly or indirectly indicating said WWW page, and that

20 the short message service centre further comprises means for converting the relevant part of the contents of the WWW page into a short message to be sent to the mobile station via the mobile communication network.

The invention further relates to an equipment for connecting the short message service centre of a digital mobile communication system to a
25 data network. The equipment is characterized in that said data network is the Internet network, and that the equipment comprises

means for retrieving Word Wide Web (WWW) pages from the Internet network using the protocols of the Internet network in response to a short message sent by a mobile station to the short message service centre, the
30 message indicating said WWW page, and

means for converting the relevant part of the contents of the WWW page into a short message to be sent to the mobile station via the short message service centre and the mobile communication network.

In the present invention, a mobile subscriber searches the Internet
35 WWW pages for information by the aid of the short message service of the mobile communication network. For this purpose the short message service

centre or other equipment in connection thereto is provided with access to the Internet network and uses HTML, HTTP, and TCP/IP protocols towards Internet. In addition, the short message service centre is connected to a mobile communication system in the usual manner such that short messages are transferred between the short message service centre and mobile stations in a manner defined for the mobile communication system.

When requiring information from an Internet WWW page, a mobile user sends to the service centre a short message including an identifier for directly or indirectly indicating said WWW page. Direct indication includes e.g. the address of the WWW page, URL. URL addresses are often quite long and hard to remember, and it is not always useful to transfer them to the service centre in a short message. In an embodiment of the invention, a mobile station sends, instead of an address, a short keyword indirectly indicating the desired WWW page. The short message service centre or said other equipment comprises a table for linking the keywords and the addresses of WWW pages.

Having received a short message, the short message centre or said other equipment contacts the desired WWW server via Internet, receives therefrom the WWW page and stores it.

The length of a short message is limited, e.g. 160 characters, whereas a WWW page may comprise an enormous amount of information. This is why in the primary embodiment of the invention the short message service centre or said other equipment is provided with means for converting or "compressing" the WWW page received from Internet into a form suitable to the transmission capacity of the short message service of the mobile communication system. In an embodiment of the invention, the short message service centre or said other equipment separates or "filters" only the relevant part of a WWW page and sends it in a short message to the mobile station. The part of a WWW page containing relevant information may be identified by a predetermined fixed criterion, common to all subscribers, or it may be based on a criterion received from the mobile station, such as a password. This password may be included in the short message sent by the mobile station, together with the identifier of the WWW page. The short message service centre or said other equipment searches the WWW page received and stored for the point including said relevant information and places it in a short message. The length of the text to be placed in a short message can be limited e.g. by character strings used on WWW pages, such as HTML tags. In this way a para-

graph of a WWW page including the desired information, for example, may be placed in the short message.

The mobile station receives and processes the "Internet" short message received from the short message centre as a normal short message. The 5 short message may be displayed on the mobile station screen in the usual manner. Thus no data transmission properties or WWW browsers are required in the mobile station for the use of the Internet WWW service. The only technical requirement is that the mobile station be provided with a conventional short message facility. In addition, the user typically has to have a subscriber contract with a short message service centre supporting the service according to 10 the invention.

The invention does not require any changes in the mobile communication network, either, but a short message centre provided with the new properties required by the invention, or with other equipment comprising them, 15 may be connected to the mobile communication network in a standard manner.

Thus the invention may be used to easily provide existing mobile communication networks with an Internet network access, and to offer it to 20 mobile station already in the network and comprising a short message facility. In principle, the mobile station user does not even have to be aware of the fact that the information required is retrieved from Internet. The user simply sends 25 an information inquiry in the form of a short message to the short message service centre and obtains the desired information in a reply message.

BRIEF DESCRIPTION OF THE DRAWINGS

25 The primary embodiments of the invention are described below with reference to the attached drawings, in which

Figure 1 is a system diagram illustrating how a mobile communication network and the Internet network are interconnected by a short message service centre according to the invention,

30 Figures 2 and 3 are signalling diagrams illustrating the transfer of an MO short message and an MT short message, respectively,

Figure 4 is a block diagram of a service centre according to a primary embodiment of the invention,

Figure 5 is a conversion table stored in a data base 43,

35 Figure 6 shows a mobile telephone with the contents of a short

message displayed on the screen.

PREFERRED EMBODIMENTS OF THE INVENTION

The present invention may be applied to all mobile communication systems supporting circuit switched speech and data services and using short message service. In the present application, short message service refers to the transfer of a short text message between a mobile station and a special short message service unit without the need to set up a point-to-point connection. This is why the transfer of a short message may take place even when in the mobile station there is a speech or data call in progress on a circuit-switched point-to-point connection. Short message transfer is limited to one message, i.e. the transfer of one message constitutes the whole transaction. Thus, short message service is totally different from packet-switched data transmission.

In the following the invention will be described in connection with the digital GSM (Global System for Mobile Communication). Regarding the invention, the operation and structure of the mobile communication system are not relevant, and hence they are described only to a degree that will assist in comprehending short message service. As to a more precise description of the GSM system, reference is made to the GSM recommendations and the publication "The GSM System for Mobile Communications", M. Mouly & M. Pautet, Palaiseau, France, 1992, ISBN:2-9507190-0-7.

Referring to Figure 1, a mobile switching centre MSC switches incoming and outgoing calls. It also performs tasks typical of mobile telephone traffic, such as subscriber location management, in co-operation with the network subscriber registers VLR and HLR. The HLR is a subscriber's home register for permanent storage of subscriber data. The visitor location register VLR is a local register to which the subscriber data is copied from the HLR when a mobile subscriber visits the area of the VLR. Mobile stations MS communicate with the centre MSC via base station systems BSS. The BSS consists of a base station controller BSC and base stations BTS, i.e. fixed radio transceivers via which the mobile stations MS communicate with the mobile communication network over the radio path.

The European Telecommunications Standards Institute (ETSI) standard GSM 03.40 describes the point-to-point (PP) short message service (SMS) of the GSM system. The SMS of the GSM network offers means for

transferring short messages with limited length (160 ASCII characters) between mobile stations MS and a short message service centre SC 10 which is outside the GSM network 11. Mobile originated (MO) and mobile terminated (MT) short message transmissions are defined as separate services. MO short
5 messages are transferred from the MS to the service centre SC. These short message may be destined for other mobile station users or for subscribers on a fixed network. MT short messages are transferred from the service centre SC to the MS. These short messages may have arrived at the service centre SC from other mobile station users or from other sources. The protocol employed between the SC and the MS is called SM-TP (Short Message Transport Protocol).
10

The service centre SC is connected to the mobile communication network via a certain MSC, called the SMS-GatewayMSC when MT short messages are involved, and SMS-InterworkingMSC when MO short messages
15 are involved. The present application uses a common name SMS-Gateway (SMS-GW). The SMS-GW relays short messages between a MS and the SC and performs the HLR (and VLR) inquiries needed for an MT message in a call. The service centre SC is given a dedicated ISDN number in the number space of the GSM network, and the MS uses the ISDN number for addressing
20 a short message to the SC.

In the following the transfer of MO and MT short messages will be briefly described with reference to Figures 2 and 3.

When wishing to send a short message (Figure 2), a user has to key in at least its contents and the ISDN number of the service centre SC that
25 will process the message. Sending a short message requires that a signalling connection (reservation of radio resources (RR)) be set up between the mobile station and the serving MSC, if such a connection does not yet exist. This is carried out in the same way as for other communication. In order to separate a short message from potential other signalling at the link layer, a link identifier
30 SAPI 3 (Service Access Point Identifier) is applied to it, whereas the SAPI of the signalling is 0. An MO short message, called an SM-TP SMS-SUBMIT message, is sent via the serving MSC and SMS-GW (on the basis of the ISDN number) to the right service centre SC.

Transmission of an MT short message is somewhat more complicated (Figure 3). The service centre initiates short message transmission by sending to the SMS-GW a message SM-TP SMS-DELIVER containing at least
35

the contents of the short message and the MSISDN number of the addressed mobile subscriber. The SMS-GW derives the subscriber's HLR address from the MSISDN number and inquires of the HLR about routing information by the message MAP/C SEND ROUTING INFO FOR SMS. HLR provides the routing 5 information (= the address of the serving MSC) by the message MAP/C SEND ROUTING INFO FOR SMS RESULT (possibly first after making a supplementary inquiry to the VLR). The SMS-GW then sends a short message, MAP/H FORWARD SHORT MESSAGE, to the serving MSC. The MSC sets up a signalling connection if it has not yet been set up, and sends to the MS a 10 short message called SM-TP SMS DELIVER. The MS receives and stores the short message and alerts the user.

It should be noted that, as regards the invention, it is insignificant how the short message service support has been implemented in the mobile communication system. In the GSM system, for example, the invention is applicable to existing networks supporting short message service. An example of such a network is the GSM network of Radiolinja Oy in Finland. The mobile station may also be any kind of mobile station supporting short message service. An example is the Nokia 2110 GSM.

In the present invention the service centre SC is connected to the 20 Internet network 12 such that it can be used as a gateway between the GSM network and the Internet network. The interface between the short message centre SC and the SC centre may be a direct interface, or the SC may be in connection with a separate computer equipment having access to the Internet network 12. Such a separate equipment is illustrated by a CPU 14 in Figure 25 14.

In this way the invention SC brings the information sources of the Internet network 12 to the use of mobile subscribers via short message service. A large number of users, local networks and servers, of which Figure 1 shows only three WWW servers 13A, 13B, and 13C, are connected to the Internet network 12.

The block diagram of Figure 4 shows an example of a service centre SC according to the invention. The interface 41 between the GSM network and the service centre SC maybe similar to that in present short message service centres.

35 A basic element in present short message service centres SC (in computers) is that they can be connected to data networks, a property which

may also be utilized at the physical level of Internet connections. The service centre SC uses HTTP and HTML protocols towards the Internet network 12. The HTTP protocol again uses TCP/IP interfaces. WWW server and customer programs usable in a service centre computer (computers) SC in retrieving 5 WWW pages according to the HTP and HTML protocols from the Internet network are commercially available for different operating systems (such as Unix). In Figure 4, an Internet interface block 42 represents these Internet-specific operations of a service centre SC.

A conversion and control unit 40 controls the retrievals of WWW 10 pages via the Internet interface 42 and the transmission and reception of short messages via the GSM interface 41. The control unit 40 converts a short message received by the GSM interface into a WWW page request to be carried out via the Internet interface 42. Correspondingly, the control unit 40 filters the relevant part of the retrieved WWW page and places it as the contents of the 15 short message which is sent via the GSM interface to the MS. In addition the service centre comprises a data base 43 for storing retrieved WWW pages and various parameters, conversion tables etc. required by the control unit.

If the service centre SC is connected to the Internet network by means of a separate computer equipment CPU14, the operational blocks of 20 Figure 4 may be decentralized between the SC and the CPU14. For example, the GSM interface 41 may be a normal short message service centre SC, whereas the control unit 40, the Internet interface 42, and the memory 43 are located in the separate equipment CPU14. This is an advantageous alternative particularly when the service according to the invention is introduced into 25 old short message service centres.

When requiring information from an Internet WWW page, a mobile user submits a short message addressed (ISDN number) to the service centre SC, the message containing an identifier for directly or indirectly indicating said WWW page. Direct indication contains e.g. the WWW page address, URL. 30 Examples of URL addresses are <http://www.nokia.com> and <http://www.uspto.gov/>. In an embodiment of the invention, instead of an URL address, the user keys in a short keyword in the short message indirectly indicating the desired WWW page. The data base 43 of the service centre SC comprises a table for linking keywords and WWW page addresses. Figure 5 shows an example of such a table. For example, when requiring information on bus schedules from a WWW page whose URL is <http://www.bus.com/timetable>, the user 35

sends the code BUS in the short message to the service centre SC.

A short message is transferred to a service centre SC as a normal MO short message. Having received the short message, the GSM interface unit 41 forwards the contents to the control unit 40. On the basis of the keyword, the control unit 40 retrieves the URL address from the table. The control unit 40 then preferably checks if said WWW page has been retrieved previously and is stored in the data base 43. If the data base 43 does not include the page, the control unit 40 retrieves the WWW page corresponding to the URL address from the Internet network via the interface 42 and stores it.

The length of a short message is limited, e.g. 160 characters, whereas a WWW page may contain an enormous amount of information. In most cases the user is interested only in certain information that is hidden among other data. Therefore, in a primary embodiment of the invention, the control unit 40 separates or "filters" only the relevant part of the WWW page and sends it in a short message to the mobile station.

The HTML language depicting WWW pages consists of tags entered in the text within angle brackets <>. Such tags are e.g. the paragraph tag <P>, the page header tag <TITLE>, change of paragraph <P> or
, a list , etc. These HTML tags appearing on WWW pages may be used to define the size of the text portion to be placed in a short message. Other arbitrary character strings may also be used alternatively or in addition. In this way e.g. a paragraph (the text between two <P> tags) of a WWW page including the desired relevant information may be placed in a short message. By using standard HTML tags as templates, all current WWW information is rendered available to the short message service without any changes or with slight changes to WWW pages. In the invention, the HTML text is converted into readable format before transmission. The text is also compressed by omitting unnecessary white fields from the text. The HTML tables are converted into separate paragraphs.

The part of a WWW page containing relevant information may be identified by a predetermined fixed criterion, common to all subscribers, or it may be based on a criterion received from the mobile station, such as a keyword.

For example, a short message including the keyword WEATHER, causes a WWW page containing weather reports to be retrieved from Internet. When using a fixed criterion, a paragraph dealing with tomorrow's weather, for

example, may be separated from this page.

When using a keyword or other search text, the WWW page is searched for the corresponding text between predetermined HTML tags. The corresponding text block is then returned to the MS in a short message (usually converted from the HTML language into a readable language). A mobile user may include the keyword in a short message requesting information from the WWW page.

A MS may send the inquiry BUS 65A, for example, in a short message. The control unit of the service centre SC retrieves from the data base the URL <http://www.bus.com/timetable> corresponding to the code BUS. The control unit then checks if the WWW page corresponding to the URL exists in the data base. If not, the control unit 43 retrieves said WWW page from Internet 12 via the interface 42 and stores it in the data base 43. A stored WWW page may have e.g. the following appearance:

15

```
<BODY>
<P> Bus company Limited Timetable </P>,
<P> 64:14.45 15.10 15.30 15.55 </P>
<P> 65A: 15.45 16.20 17.30 </P>
</BODY>
<HTML>
```

20

25

The control unit 40 searches the WWW page for the paragraph including the keyword 65A and deletes superfluous information. In this case the short message to be sent to the mobile station MS would look like this:

65A: 15.45 16.20 17.30

30

The control unit 40 sends this short message via the GSM interface 41 to the GSM network where it is relayed to the MS in the same manner as described in Figure 3. The MS receives and processes the "Internet" short message received from the short message centre as a normal short message. The short message may be displayed on the mobile station screen in the usual manner, as illustrated in Figure 6.

35

Another way to proceed is to use WWW pages with inquiry scripts, i.e. inquiry expressions drawn up in a command language. This means that it

is the WWW server maintaining the WWW page that filters the relevant part of the WWW page according to the inquiry it received and returns the relevant part as a WWW page to the service centre SC. The service centre has to be aware of the inquiry format of each WWW page (service). In addition, the mobile subscriber should be aware of all inquiry keywords. With this type of functionality the searches would, however, be more accurate.

For example, in response to a short message including the above described inquiry BUS 65A, the service centre SC could send to the WWW server of the WWW page <http://www.bus.com/timetable> the inquiry <http://www.bus.com/timetable?bus=65A>. According to the inquiry parameters and the inquiry script of the WWW page, the WWW server creates a reply which is sent in HTML format (a WWW page) via Internet 12 back to the service centre SC. The reply from the WWW server could look like this:

15 <BODY>
 Timetable for bus 65A:
 15.45 16.20 17.30
 </BODY>
 <HTML>

20 The control unit 40 of the service centre SC converts and cleans up the reply into readable text format, the final short message looking like this:

Timetable for bus 65A: 15.45 16.20 17.30

25 In the above described cases the control unit 40 sends only the relevant part of a WWW page in a short message. In an embodiment of the invention, the control unit has, however, an optional operation mode wherein it does not search for the relevant part of a WWW page, but instead sends the whole page, as a cleaned-up version: the HTML text is converted into readable format and the superfluous empty fields are deleted in order to compress the text and reduce message size. This is similar to the procedure performed above in the last example.

30 In still another embodiment of the invention the control unit 40 has an optional operation mode wherein the contents of a WWW page are sent in HTML format in a short message. Only the superfluous empty fields are de-

leted to reduce the size of the short message.

In the above the invention has been illustrated by means of primary embodiments. The invention is not, however, limited to the solutions presented, but can be varied within the scope and spirit of the attached claims.

CLAIMS

1. A method for accessing a data network in a digital mobile communication system providing short message service, characterized in that the method comprises the steps of

5 transferring a short message including an identifier indicating a Word Wide Web (WWW) page in the Internet network from a mobile station over the mobile communication network to a short message service centre having access to the Internet network either directly or via a computer in connection with said service centre,

10 communicating towards the Internet network using the protocols of the Internet network and retrieving said WWW page indicated by said short message, or a of said WWW page,

converting a relevant part of the contents of said WWW page into a short message,

15 sending the short message over the mobile communication network to the mobile station,

displaying the contents of the short message on the display of the mobile station.

20 2. A method as claimed in claim 1, characterized by indicating the WWW page indirectly in the short message by means of a keyword,

converting the keyword into the Uniform Resource Locator (URL) address of the WWW page by means of a keyword/URL conversion table,

retrieving the WWW page on the basis of the URL address.

25 3. A method as claimed in claim 1 or 2, characterized in that said conversion of the WWW page into a short message comprises the step of

30 identifying said relevant part on the WWW page by a search criterion which is either fixed or has been received in said short message from the mobile station.

4. A method as claimed in claim 3, characterized in that said search criterion comprises one or more keywords.

35 5. A method as claimed in claim 1, 2, 3 or 4, characterized in that said conversion of the WWW page into a short message comprises the step of

separating said relevant text part from the WWW page as a whole, limited by a predetermined character string.

6. A method as claimed in claim 5, characterized in that said character string is a Hyper Text Mark-Up Language (HTML) tag in the
5 WWW page.

7. A method as claimed in claim 6, characterized in that the whole of said text and the HTML tag corresponding thereto are some of the following: paragraph and HTML tag <P>; page header and HTML tag <TITLE>; paragraph change and HTML tag <P> or
; and a list and HTML
10 tag .

8. A method as claimed in claim 1 or 2, characterized by sending the search criterion to the WWW page WWW server in the Internet network as indicated by the short message,

separating said relevant part of said WWW page in the WWW
15 server on the basis of the search criterion,

returning a modified WWW page from said WWW server in response, the page containing only said relevant part,

converting the WWW page into a short message which is sent to the mobile station.

20 9. A method as claimed in any one of the previous claims, characterized in that said conversion of the WWW page into a short message comprises the step of

optimizing the length of the short message by deleting superfluous empty areas, such as multiple spaces, from said relevant part.

25 10. A method as claimed in any one of the previous claims, characterized in that said conversion of the WWW page into a short message comprises the step of

converting said relevant part from HTML format into normal text format.

30 11. A method as claimed in any one of the previous claims, characterized in that said communication with the Internet network and said conversion of the WWW page into a short message is carried out in said separate computer (14) which is in connection with the short message service centre (SC).

35 12. A short message service centre for a digital mobile communication system providing short message service, the short message service cen-

tre (SC) comprising

first means (41) for accessing a mobile communication network (11) for transferring short messages between the short message service centre (SC) and mobile stations (MS), and

5 second means (42) for accessing a data network (12),

characterized in that

said data network (12) is the Internet network,

10 said second means (42) comprise means for retrieving Word Wide Web (WWW) pages from the Internet network using the protocols of the Internet network in response to a short message sent by a mobile station, the message either directly or indirectly indicating said WWW page, and that

15 the short message service centre further comprises means (40,43) for converting the relevant part of the contents of the WWW page into a short message to be sent to the mobile station via the mobile communication network.

13. A short message service centre as claimed in claim 12, characterized in that said indirect indication comprises the use of a keyword, and that the short message service centre comprises a means (43) for storing information on the association between the keywords and the Uniform Resource Locator (URL) addresses of the WWW pages.

20 14. A short message service centre as claimed in claim 12 or 13, characterized in that the conversion means (40) comprise means for identifying said relevant part on the WWW page by a search criterion which is either fixed or has been received in said short message from the mobile station.

25 15. A short message service centre as claimed in claim 12, 13 or 14, characterized in that the conversion means (40) comprise means for separating said relevant text part from the WWW page as a whole, limited by a predetermined character string of the WWW page, such as a Hyper Text Mark-Up Language (HTML) tag.

30 16. A short message service centre as claimed in claim 15, characterized in that the whole of said text and the HTML tag corresponding thereto are some of the following: paragraph and HTML tag <P>; page header and HTML tag <TITLE>; paragraph change and HTML tag <P> or
; and a list and HTML tag .

35 17. A short message service centre as claimed in claim 12, 13, 14,

15 or 16, characterized in that the conversion means (40) comprise means for optimizing the length of the short message by deleting superfluous empty areas, such as multiple spaces, from said relevant part, and for converting said relevant part from HTML format into normal text format.

5 18. A short message service centre as claimed in claim 12, characterized in that said second means are located in a computer (14) which communicates with the short message service centre.

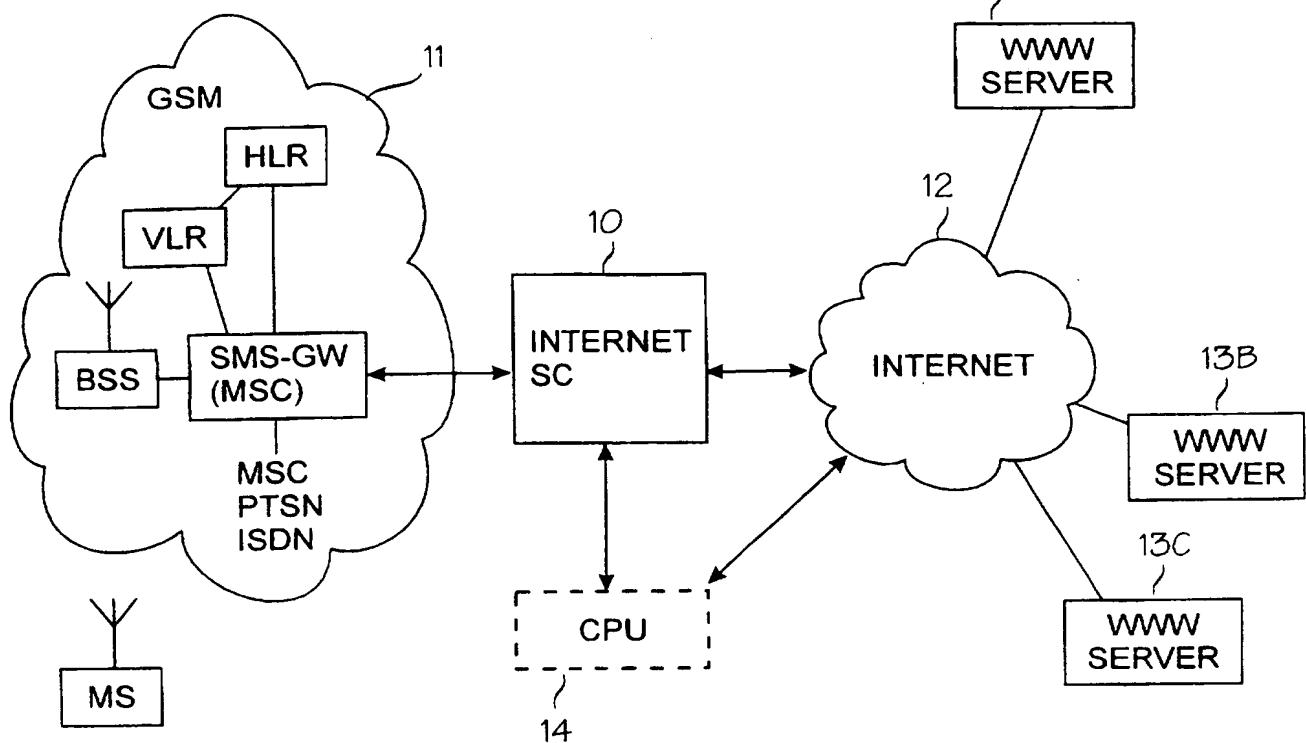
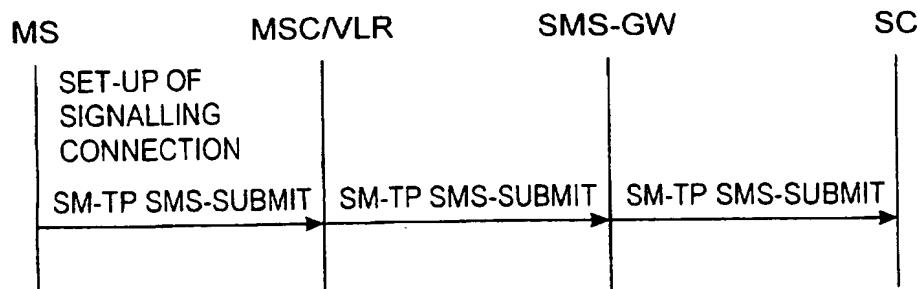
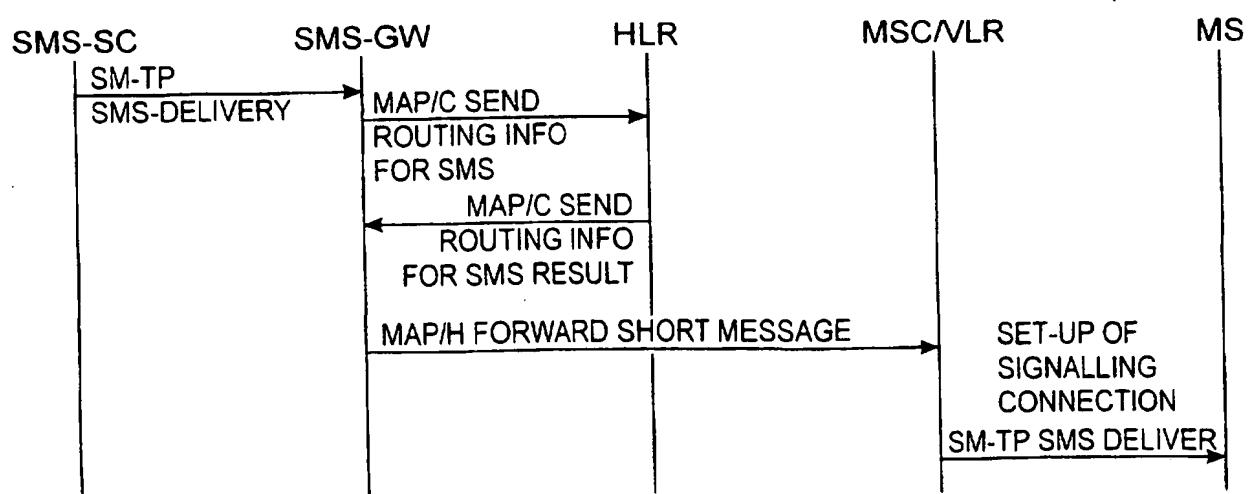
10 19. An equipment for connecting the short message service centre of a digital mobile communication system to a data network, characterized in that said data network (12) is the Internet network, and that the equipment (14) comprises

15 means for retrieving Word Wide Web (WWW) pages from the Internet network using the protocols of the Internet network in response to a short message sent by a mobile station to the short message service centre, the message indicating said WWW page, and

means (40,43) for converting the relevant part of the contents of the WWW page into a short message to be sent to the mobile station via the short message service centre and the mobile communication network.

20 20. An equipment as claimed in claim 19, characterized in that the equipment is a computer unit (14) communicating with the short message service centre and having access to the Internet network.

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**Fig. 2****Fig. 3**

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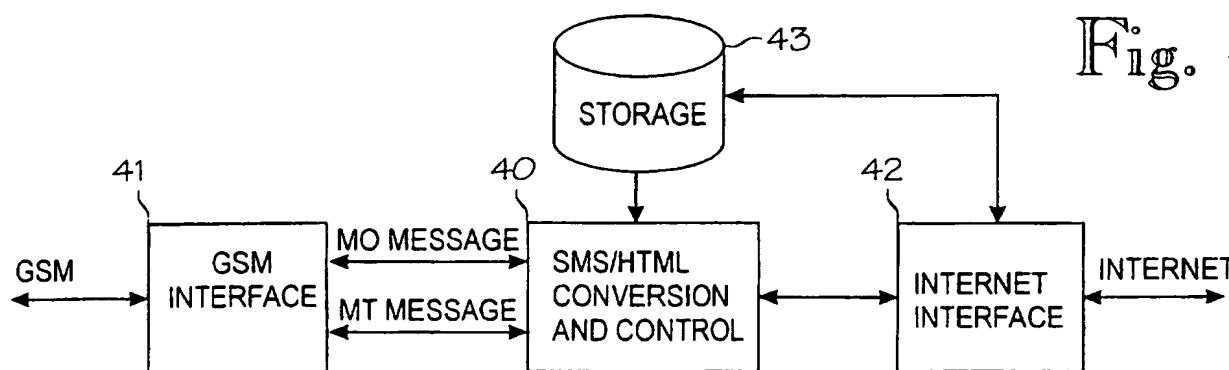


Fig. 4

KEYWORD	URL
BUS	WWW.BUS.COM/TIMETABLE
WEATHER	WWW.FORECAST.FI
FLIGHT	WWW.FINNAIR.FI
RATE	WWW.REUTERS.COM
MOVIES	WWW.RADIOCITY.FI/MOVIES

Fig. 5

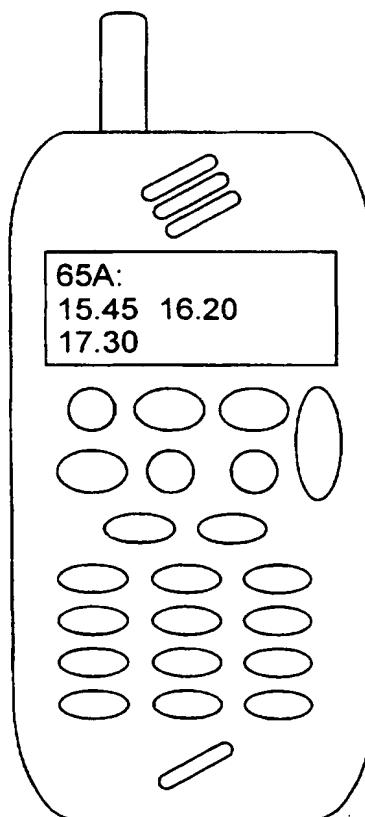


Fig. 6

INTERNATIONAL SEARCH REPORT

1

International application No.

PCT/FI 97/00547

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9609714 A1 (BELL COMMUNICATIONS RESEARCH, INC.), 28 March 1996 (28.03.96), column 5, line 5 - line 25; column 6, line 15 - line 17; column 11, line 21 - line 22, column 25, line 17 - column 26, line 2, column 54, line 14 - line 19, column 55, line 4 - line 8 --	1-20
P,X	WO 9708906 A1 (SENDIT AB), 6 March 1997 (06.03.97), page 17, line 4 - line 36 --	1,12,19
A	SE 503752 C2 (SENDIT AB), 26 August 1996 (26.08.96), page 1, line 1 - line 13; page 3, line 5 - line 14 --	1-20

 Further documents are listed in the continuation of Box C. See patent family annex.

- * Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00547

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5392452 A (WALTER L. DAVIS), 21 February 1995 (21.02.95), column 3, line 22 - line 43; column 7, line 8 - line 27 --	1,12,19
P,A	EP 0777394 A1 (ALCATEL BELL), 4 June 1997 (04.06.97), column 1, line 47 - column 2, line 34; column 4, line 45 - column 5, line 51, abstract -- -----	1,12,19

INTERNATIONAL SEARCH REPORT
Information on patent family members

03/02/98

International application No.

PCT/FI 97/00547

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO	9609714 A1	28/03/96	CA	2199802 A	28/03/96
			EP	0782805 A	09/07/97
			JP	9511884 T	25/11/97
WO	9708906 A1	06/03/97	AU	6894196 A	19/03/97
			SE	503752 C	26/08/96
			SE	9502995 A	26/08/96
SE	503752 C2	26/08/96	AU	6894196 A	19/03/97
			SE	9502995 A	26/08/96
			WO	9708906 A	06/03/97
US	5392452 A	21/02/95	AU	673221 B	31/10/96
			AU	5617794 A	22/06/94
			BG	99745 A	29/12/95
			CN	1095881 A	30/11/94
			CZ	9501336 A	15/01/97
			EP	0671084 A	13/09/95
			FI	952577 A	26/05/95
			HU	73106 A	28/06/96
			HU	9501551 D	00/00/00
			JP	8504068 T	30/04/96
			NO	952099 A	29/05/95
			NZ	258484 A	26/10/95
			PL	309247 A	02/10/95
			WO	9413070 A	09/06/94
EP	0777394 A1	04/06/97	NONE		